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March 14, 2003

Mr. Richard Rodriguez
Major Investigations Division
National Transportation Safety Board
AS-10, Room 5305
490 L'Enfant Plaza East, SW
Washington, D.C. 20594-2000

Subject: ALPA Comments on Referenced Accident
Reference: Accident involving FedEx Flight 1478 at Tallahassee on 07/26/02
(NTSB # DCA02MA054)

Dear Mr. Rodriguez:

In accordance with the Board's rules the Air Line Pilots Association offers the following comments and safety recommendations regarding the subject accident involving FedEx Flight 1478 which occurred on July 26, 2002 at Tallahassee Regional Airport (TLH), Tallahassee, Florida.

History of the Flight

FedEx 1478, a Boeing 727-232, N497FE, was operating as a Part 121 scheduled cargo flight from Memphis, Tennessee (MEM) to Tallahassee, Florida (TLH) on March 26, 2002, with a crew of three. At the time of the accident, night visual meteorological conditions existed. The aircraft crashed into trees on short final to runway 9 at TLH. All three crewmembers were injured in the accident, two of them seriously. The aircraft was destroyed by the impact and resulting fire.

Approach to TLH

During the approach into TLH, the crew elected to accomplish a visual approach to runway 9, utilizing the PAPI (Precision Approach Path Indicator) for vertical guidance. This approach was permitted by FedEx operational specifications. The crew briefed during the approach that the CFIT (Controlled Flight Into Terrain) risk at TLH was moderate for the airport. This risk is linked to certain factors at a particular airport (surrounding terrain, airport lighting, etc.) and is not given for a specific runway. Under this methodology, an approach to runway 27 which has both an ILS (Instrument Landing System) and a PAPI would have the same CFIT rating as runway 9 which has only a visual method (PAPI) for guidance. The crew attempted to activate the airport lighting at 05:22:07 Eastern Daylight Time (EDT), but the lighting did not activate. After two more attempts (the second one successful), the airport lights finally activated at 05:34:26 EDT, just three minutes prior to landing. The aircraft

struck trees on the approach path for runway 9, and the aircraft came to rest approximately 1500 feet short of the approach end of runway 09.

PAPI Issues

During the approach to TLH, the flightcrew never received any visual indications from the Precision Approach Path Indicator (PAPI) that they were off glidepath. Also, an evaluation of PAPIs by the FAA clearly shows that dew and frost can interfere with PAPI functionality. The PAPI is a set of four lights that are used to provide vertical visual guidance to a runway.

Each of the four lights in a PAPI consists of a light source and a lens system. The lenses allow the light source to be focused into a beam up the approach path at the runway end. The upper half of the beam is white, while the lower half is red. Each light beam is angled 20 minutes apart from the light to the left of it, giving four different glide paths. An on-glidepath signal is represented by two white lights and two red lights. If an aircraft is below glidepath, there will be more red lights visible to the flight crew. If the aircraft is above glidepath there will be more white lights visible.

The First Officer (pilot flying) said the PAPI initially indicated white next to red, indicative of the aircraft being on glidepath. When asked if that indication ever changed, the First Officer said; "from the time I rolled out, I saw that I was on glide slope, added that power for the two knots, and it never changed. After that, since I have no memory of the remainder of the flight, I just can't say." During the approach to runway 9, both the captain and second officer report seeing pink signals from the PAPI. When asked to describe the PAPI indications during the approach, the Captain said, "First white pink, white white for a short time, then it went white pink, stayed there a little while then mist, white red, stayed at white red, stayed at white red and that's the last I remember." The Second Officer states that he saw a PAPI system on the left hand side of the runway – a white, a pink, and two reds. The Second Officer further states that he never saw the PAPI lights indicate that they were really low on the approach, and that he never saw all red lights.

When the PAPI systems were evaluated by the FAA Technical Center in 1983, one major weakness was discovered (Report No. DOT/FAA/CT-82/153). The FAA Technical Center singled out condensation as a source of concern in their report. The report's "Summary of Results" states: "It was found that during certain critical weather conditions, condensation forming on the PAPI lenses could produce transient false pink signals." The report also states "Condensation on the exterior of the PAPI lenses must be prevented by either operational procedures or inclusion of heating devices in the fixture design." There were no protections in place for the PAPIs at TLH. The PAPIs at the time of the accident were activated by the pilot controlled lighting (PCL) system. As noted previously, while there were three attempts to activate the PCL (at 05:22:07, 05:30:32, 05:34:31 EDT respectively), the airport lights did not activate until just three minutes prior to landing. The lighting activation log from TLH recorded the lights starting to sequence 'on' at 05:34:26, and that all of the lights were on by 05:34:31. The CVR recording ended at 05:37:26, just three minutes after light activation. According to the FAA Technical Center report, this would not have been enough time for the heavy dew of that morning to burn off, resulting in the pink indications observed by the Captain and Second Officer. According to the FAA Technical Center's report on PAPIs:

"This pink signal, as viewed by a pilot, could have been interpreted to be white, giving a false 'fly down' signal. A dangerous condition." Tests conducted during the evaluation found that after activation, it took 10 minutes for dew, and 30 minutes for frost, to dissipate and for normal signal presentations to be provided.

On December 12, 2002, the FAA released Cert Alert No. 02-08 on PAPI operation to all airport operators, airline operators, and FAA Airport Certification Safety Inspectors. In this Cert Alert, the FAA recommended that at airports where PAPI units are not operated continuously, airport lighting circuitry be changed so that PAPI's are preset to operate continuously on a low power setting, in order to ensure that there are no false signals due to dew or frost contamination.

Based on the FAA's Cert Alert and other information found during the investigation, the Air Line Pilots Association released an Operations Bulletin (2003-01) concerning PAPI contamination by dew or frost. The bulletin recommends that when operating into airports with pilot controlled lighting, crews should crosscheck the PAPI glide slope indications with another source, such as an ILS. The bulletin further recommends that crews activate airport lights as early as possible while approaching an airport with pilot controlled lighting. This should allow time for any contamination of the PAPI to clear prior to final approach. Additionally, crews are urged to immediately abandon the approach until accurate vertical guidance can be assured, if the PAPI guidance they are receiving is in any way questionable and there are no other means of vertical guidance available for crosscheck. This bulletin was distributed to all of ALPA's 66,000 pilots as well as the NASA ASRS Office, IFALPA Headquarters, AOPA, NATCA, ATA, NBAA, and the FAA.

Fatigue and Human Performance Issues

The First Officer was undoubtedly negatively affected by flying through two consecutive windows of circadian lows in a row. The First Officer was scheduled for, and mentally prepared for rest when he returned to Memphis, TN (MEM) from Grand Forks, ND (GFK). When he returned to MEM, he was informed that he was assigned to the flight to TLH later that night. After having flown through one circadian low on July 25th, the First Officer needed quality rest, but instead was scheduled to fly through his second circadian low on the 26th. This is not the first time crew rest played an important part in an accident. Two other cargo flights (DC-8-63 operated by Air Transport International at Kansas City, Missouri, and DC-8-61 operated as American International Airways Flight 808 at Leeward Point Airfield at the U.S. Naval Air Station, Guantanamo Bay, Cuba) have caused the NTSB to make flight and duty time recommendations previously. In fact, the NTSB continues to list "Human Fatigue in Transportation Operations" on its Most Wanted list, with "action needed by the Department of Transportation, the Federal Aviation Administration..." listed also. More needs to be done.

Crew fatigue is undoubtedly a major factor in this accident. The negative effects on flight crew judgment and skills resulting from fatigue are well known and well documented in various scientific studies. As can be seen from the flight crew 72-hour histories, the Captain and First Officer involved were most definitely not well rested when performing their duties on Flight 1478. Fatigue involved in back-side-of-the-clock flying, such as done routinely at

FedEx and similar cargo carriers, has been specifically noted as hazardous and likely to result in aircrew errors in studies done by NASA, among others.

As noted in the First Officer's (Pilot Flying) interview, he had planned his rest periods during his layover from his previous pairing, based on his belief that he would be released from duty after his return to MEM. When notified of his further assignment, he questioned its legality with the FedEx duty officer. The First Officer was informed by the duty officer that he could legally be scheduled for the trip, and was directed to the question and answer section of the union contract. When questioned during the investigation on this issue specifically, he stated his concern about calling in fatigued was based on his impression that calling in fatigued was considered a red flag in the FedEx Air Operations Department, implying that he felt that possible repercussions might occur if he did so. In addition to the above, he stated that he was not accustomed to flying under the R-24 rules (R-24 allows a crewmember to be available for notification of a duty assignment 24 hours a day), and that his usual method of ensuring adequate rest was to bid and fly trips that occurred in the morning flying period so as to more easily shift his sleep/rest cycle to the day sleep schedule. This routine was disrupted by the assignment of his trips prior to and including the accident flight.

The Captain, in his interview statements, had also mentioned that he had had multiple nights of less than adequate sleep prior to the assignment to the TLH flight. The Captain had personal issues that had kept him from good nights' rest in at least the two previous nights. These problems and the lack of good sleep prior to the assignment of a back-side-of-the-clock flight are obvious contributors to cumulative fatigue, and its related potential for increased errors in the performance of the Captains duties.

Hazardous Materials

Like all of FedEx's domestic flights, Flight 1478 had a hazardous material container (Haz Can) in position number one. The Haz Can is specially designed to offer both containment and fire suppression to the hazardous material inside. This is the only such containment and suppression found on the main upper deck of the entire FedEx fleet. On all domestic flights, the Haz Can is placed in the forward most position (closest to the crew) so as to be readily accessible to the crew. On flights that originate or terminate at a non-US airport , pallets are used instead of Haz Cans. Pallets are sheets of metal that freight or dangerous goods are stacked upon, and then are secured by netting. Pallets offer no containment or fire suppression. If a pallet contains dangerous goods, it is also loaded in the forward most position, closest to the flight crew.

The Haz Can on Flight 1478 held two large wet cell batteries containing a net quantity of 1072 pounds of Class 8 corrosive material, specifically battery acid. Evidence at the crash site found that the two batteries had ruptured during impact, and that the acid had escaped. Due to the ensuing fire, it is unknown what happened to the corrosive acid after the batteries ruptured, but we do know that the crew walked away from the crash with no visible evidence of physical exposure to the acid. It is clear that the Haz Can contributed greatly to the hazardous materials being contained even after breaching its packaging. If the batteries had been placed on an open pallet, the potential for the corrosive contents being thrown forward into the cockpit or crew evacuation route would have been much greater.

Findings

1) During its 1983 evaluation of PAPI systems, the FAA determined that PAPI performance could be adversely affected by dew or frost, and provide unreliable glide path information to pilots.

2) The FAA Technical Center's 1983 evaluation report states that: "This pink signal, as viewed by a pilot, could have been interpreted to be white, giving a false 'fly down' signal."

3) The FAA did not inform pilots of this PAPI contamination issue until December 2002.

4) Conditions at TLH the morning of the accident were conducive to contamination of the PAPI unit by dew.

5) Despite attempts to do so earlier, the crew of FDX 1478 was unable to activate the PAPI lighting at TLH until three minutes prior to landing.

6) None of the three crewmembers observed extreme fly up (all red) indications from the PAPI.

7) The Captain and Second Officer both observed pink indications from the PAPI.

8) The First Officer's schedule on the 25th and 26th had him flying through two consecutive windows of circadian lows in a row. After having flown through one circadian low on July 25th, the First Officer needed quality rest upon his return to MEM, but instead was scheduled to fly through his second circadian low on the 26th.

9) The First Officer believed that he would be released from duty after his return to MEM from GFK. When notified of his further assignment to the accident flight, he questioned its legality, but stopped short of calling in fatigued.

10) The First Officer had an impression that calling in fatigued was considered a red flag in the FedEx Air Operations Department corporate culture, and was concerned that possible repercussions might occur if he did so.

11) The additional protection of the Haz Can prevented the flight crew from being injured by the hazardous materials during the impact and evacuation sequence.

Safety Recommendations

Based on the events of Flight 1478, the following safety recommendations are made:

To the FAA:

1) Implementation of FAA Cert Alert No. 02-08 should be mandatory for all airports that utilize pilot controlled lighting and PAPIs.

2) Notify, on a one-time basis, all US certificated pilots about the potential hazards and mitigation strategies associated with the PAPI susceptibility to dew and frost. Guidance material should be distributed that explains when contamination can occur, what to look for to determine if the PAPI is contaminated, and what action should be taken if PAPI contamination is suspected.

3) Incorporate guidance material, which discusses the potential erroneous PAPI indications into the next edition of the AIM. Guidance material should explain when contamination can occur, what to look for to determine if the PAPI is contaminated, and what action should be taken if PAPI contamination is suspected.

4) Because Haz Cans have proven to protect crews in this and other accidents, they should be required for all US freight carriers caring dangerous goods, whether domestic or international.

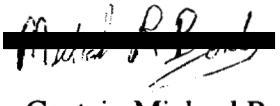
5) Ensure that Operators corporate cultures are non-threatening to flight crews calling in fatigued, especially during back-side-of-the-clock operations. Flight crews should never be afraid to call in fatigued due to real or perceived fears of discipline or other detrimental repercussions to their careers.

To FedEx:

1) FedEx should associate its 'CFIT hazard level' with individual runways instead of an airport as a whole. As an example, runway 27 at TLH with an ILS and a PAPI as a backup is far less conducive to CFIT than runway 9 with a PAPI as sole means for vertical guidance.

ALPA appreciates the opportunity to have participated as a party to the investigation, and the opportunity to comment. We believe our findings and recommendations will be of assistance to the Safety Board.

Sincerely,



Captain Michael R. Bender
ALPA Coordinator

cc: Acting Chairman John Hammerschmidt
Member John Goglia
Member Carol Carmody
Mr. Daniel Diggins, Federal Aviation Administration
Mr. Patrick McCormick, National Air Traffic Controllers Association
Mr. David Pollard, Tallahassee Regional Airport
Mr. Alan Ray, FedEx Express
Mr. Mark Smith, The Boeing Company